PENDING CLAIMS AS AMENDED

Please amend the claims as follows:

1. (Currently Amended) A method for ~~transmitting data from a transmitter to a receiver~~communication in a multiple-input multiple-output (MIMO) ~~communication~~wireless system, comprising:

receiving a plurality of signals at [[the]] a receiver via a plurality of receive antennas, wherein each of the received signals at each of the plurality of receive antennas comprises a combination of one or more signals transmitted from a transmitter,

processing the plurality of received signals to derive channel state information (CSI) indicative of characteristics of a plurality of transmission channels between the receiver and the transmitter~~ used for transmitting data~~;

transmitting the CSI to the transmitter, wherein the transmitter calculates frequency bin energies for a plurality of frequency bins on a plurality of transmit antennas at the transmitter according to a limited power available at each transmit antenna and in accordance with water-pouring equations based in part on the CSI and using an iterative method, and further wherein the transmitter conditions modulation symbols in accordance with the calculated frequency bin energies.

~~calculating frequency bin energies for a plurality of frequency bins on a plurality of transmit antennas at the transmitter according to a limited power available at each transmit antenna and in accordance with water pouring equations, wherein the water pouring equations include water pouring parameters~~ $\cancel{B_m; 1 \leq m \leq N_T}$~~, which satisfy~~

$$\cancel{\max\left[\left(B_m - \frac{1}{\Gamma_m(n)}\right), 0\right] - e_m(n) = 0; 1 \leq m \leq N_T; 1 \leq n \leq N_F}$$

$$\cancel{\sum_{n=1}^{N_F} e_m(n) - E_m = 0; 1 \leq m \leq N_T}$$

~~and where E_m is a maximum energy available for transmission of a single OFDM symbol at one of the transmit antenna m, and $\Gamma_m(n)$ is defined by~~

$$\cancel{\Gamma_m(n) = \underline{\mathbf{h}}_m^H(n)\left[N_0\underline{\mathbf{I}} + \sum_{\substack{\ell=1\\ \ell\neq m}}^{n_{tx}} \varepsilon_m(n)\underline{\mathbf{h}}_\ell(n)\underline{\mathbf{h}}_\ell^H(n)\right]^{-1}\underline{\mathbf{h}}_m(n)}\text{; and}$$

~~conditioning the transmitted modulation symbols in the transmitter in accordance with the calculated frequency bin energies, and transmitting conditioned modulation symbols from the transmitter to the receiver.~~

2. (Original) The method as recited in claim 1 wherein the frequency bin energies are calculated by solving sets of non-linear equations while maintaining a measure of error at an acceptable level.

3. (Original) In a MIMO communication system with limited power for each transmit antenna, a method for determining bin energy level allocation to each OFDM frequency bin at each transmit antenna, comprising:

determining an estimate of a solution vector including elements of said allocation bin energy level to each OFDM frequency bin at each antenna;

determining an error function based on said determined solution vector;

determining an error magnitude based on said determined error function;

comparing said error magnitude to an error threshold; and

accepting said estimate of said solution vector with said elements of said allocation bin energy level when said error magnitude is less than said error threshold.

4. (Original) The method as recited in claim 3 further comprising:

continuing, in an iterative manner, said determining said estimate of said solution vector, said determining said error function and said error magnitude and said comparing said error magnitude to said error threshold until said error magnitude is less than said error threshold.

5. (Original) The method as recited in claim 3 wherein said determining said estimate of said solution vector including:

allocating initially an equal energy level to each bin of the OFDM frequency bins at each transmit antenna;

calculating signal to noise ratio in each of said frequency bins at each of said antennas ($\Gamma_m(n)$) for each transmit antenna and OFDM frequency bin and based on said allocated equal energy level to each bin;

determining bin energy level and a water pouring parameter at each antenna based on said calculated $\Gamma_m(n)$ while satisfying a set of water-pouring equations; and

wherein said determined said estimate of said solution vector is based on said determined energy level of each bin and said water pouring parameter.

6. (Original) The method as recited in claim 5 wherein said iterative manner includes correcting said determined solution vector based on a correction vector and a step multiplier.

7. (Currently Amended) The method as recited in claim 6 wherein said correction ~~factor~~vector is based on Jacobian of said determined solution vector and said error function.

8. (Original) The method as recited in claim 6 wherein said correction vector is adjusted to determine a new solution vector in each iterative step.

9. (Original) The method as recited in claim 8 further comprising the step of determining a new error magnitude after each iterative step and comparing the new error magnitude to said error threshold.

10. (Original) In a MIMO communication system with limited power for each antenna, an apparatus for determining bin energy level allocation to each OFDM frequency bin at each transmit antenna, comprising:

means for determining an estimate of a solution vector including elements of said allocation bin energy level to each OFDM frequency bin at each antenna;

means for determining an error function based on said determined solution vector;

means for determining an error magnitude based on said determined error function;

means for comparing said error magnitude to an error threshold; and

means for accepting said estimate of said solution vector with said elements of said allocation bin energy level when said error magnitude is less than said error threshold.

11. (Original) The apparatus as recited in claim 10 further comprising:

means for continuing, in an iterative manner, said determining said estimate of said solution vector, said determining said error function and said error magnitude and said comparing said error magnitude to said error threshold until said error magnitude is less than said error threshold.

12. (Currently Amended) The apparatus as recited in claim 10 wherein said means for determining said estimate of said solution vector including:

means for allocating initially an equal energy level to each bin of the OFDM frequency bins at each transmit antenna;

means for calculating <u>signal to noise ratio</u> $\Gamma_m(n)$ for each transmit antenna and OFDM frequency bin and based on said allocated equal energy level to each bin;

means for determining bin energy level and a water pouring parameter at each antenna based on said calculated $\Gamma_m(n)$ while satisfying a set of water-pouring equations; and

wherein said determined said estimate of said solution vector is based on said determined energy level of each bin and said water pouring parameter.

13. (Original) The apparatus as recited in claim 11 wherein said iterative manner includes correcting said determined solution vector based on a correction vector and a step multiplier.

14. (Original) The apparatus as recited in claim 13 wherein said correction factor is based on Jacobian of said determined solution vector and said error function.

15. (Original) The apparatus as recited in claim 11 wherein said correction vector is adjusted to determine a new solution vector in each iterative step.

16. (Original) The apparatus as recited in claim 15 further comprising means for determining a new error magnitude after each iterative step and comparing the new error magnitude to said error threshold.

17. (Original) A processor configured for use in a MIMO communication system with limited power for each antenna, the processor for determining bin energy level allocation to each OFDM frequency bin at each transmit antenna, comprising:

a transmit channel processor for coupling to a transmitter in said communication system;

wherein said transmit channel processor is configured for:

determining an estimate of a solution vector including elements of said allocation bin energy level to each OFDM frequency bin at each antenna of said transmitter;

determining an error function based on said determined solution vector;

determining an error magnitude based on said determined error function;

comparing said error magnitude to an error threshold; and

accepting said estimate of said solution vector with said elements of said allocation bin energy level when said error magnitude is less than said error threshold.

18. (Original) The processor as recited in claim 17 wherein said transmit channel processor further configured for continuing, in an iterative manner, said determining said estimate of said solution vector, said determining said error function and said error magnitude and said comparing said error magnitude to said error threshold until said error magnitude is less than said error threshold.

19. (Currently Amended) The processor as recited in claim 17 wherein said determining said estimate of said solution vector including:

allocating initially an equal energy level to each bin of the OFDM frequency bins at each transmit antenna;

calculating signal to noise ratio $\Gamma_m(n)$ for each transmit antenna and OFDM frequency bin and based on said allocated equal energy level to each bin;

determining bin energy level and a water pouring parameter at each antenna based on said calculated $\Gamma_m(n)$ while satisfying a set of water-pouring equations; and

wherein said determined said estimate of said solution vector is based on said determined energy level of each bin and said water pouring parameter.

20. (Original) The processor as recited in claim 17 wherein said iterative manner includes correcting said determined solution vector based on a correction vector and a step multiplier.

21. (Currently Amended) The processor as recited in claim 20 wherein said correction ~~factor~~ vector is based on Jacobian of said determined solution vector and said error function.

22. (Original) The processor as recited in claim 20 wherein said correction vector is adjusted to determine a new solution vector in each iterative step.

23. (Original) The processor as recited in claim 22 further comprising the step of determining a new error magnitude after each iterative step and comparing the new error magnitude to said error threshold.